CLAIMS

What is claimed is:

1. A NA equalizing apparatus comprising:

a transmission element, said transmission element having an input surface;

said input surface having a first input dimension and a second input dimension, said second input dimension being substantially orthogonal to said first input dimension; and

wherein said first input dimension is substantially unequal to said second input dimension.

2. The NA equalizing apparatus of claim 1, wherein first input dimension is substantially larger than said second input dimension.

3. The NA equalizing apparatus of claim 1, wherein first input dimension is substantially smaller than said second input dimension.

4. The NA equalizing apparatus of claim 1, wherein said input surface has a shape selected from the group consisting of:

an ellipse,

a rectangle,

an oval,

a double circle,

a hexagon, and

an octagon.

5. The NA equalizing apparatus of claim 1, wherein said transmission element comprises further:

an axis;

an output surface, said output surface comprising:

a first output dimension and a second output dimension, said second output dimension being substantially orthogonal to said first output dimension, said second output dimension being substantially parallel to said second input dimension; and

a first input NA in a plane of said first input dimension and said axis;

a second input NA in a plane of said second input dimension and said axis;

wherein a first ratio of a first product of said first input dimension and said first input NA to said first output dimension is substantially equal to a second ratio of a second product of said second input dimension and said second input NA to said second output dimension.

6. The NA equalizing apparatus of claim 5, wherein said output surface comprises a substantially convex output surface.

7. The NA equalizing apparatus of claim 5, wherein said transmission element comprises further a lens disposed proximate to said output surface.

8. The collecting and condensing system of claim 5, wherein said output surface comprises a substantially spherical output surface.

9. The collecting and condensing system of claim 5, wherein said output surface comprises a substantially toroidal output surface.

10. The collecting and condensing system of claim 5, wherein said output surface comprises a substantially flat output surface.

11. The collecting and condensing system of claim 5, wherein said output surface comprises a substantially aspherical output surface.

12. The NA equalizing apparatus of claim 5, wherein said output surface has a shape selected from the group consisting of:

a circle,

a rectangle,

a square,

a pentagon,

a hexagon, and

an octagon.

13. The NA equalizing apparatus of claim 5, wherein said input surface transitions to said output surface, said transition selected from the group consisting of:

a straight transition,

a curved transition,

a tapered transition,

a parabolic transition, and

a hyperbolic transition.

14. The NA equalizing apparatus of claim 1, wherein said transmission element is comprised of a material selected from the group consisting of:

glass,

acrylic,

silicon,

plastic, and

quartz.

15. The NA equalizing apparatus of claim 1, wherein said transmission element comprises a hollow tube.

16. The NA equalizing apparatus of claim 15, wherein said hollow tube comprises further an inner surface coated with a substantially reflective coating.

17. A NA equalizing system comprising:

a reflector having a first and a second focal points;

a source of electromagnetic radiation located proximate to said first focal point to produce rays of radiation that are reflected by said reflector and converge substantially at said second focal point;

a transmission element to be illuminated with at least a portion of the electromagnetic radiation emitted by said source, said transmission element comprising:

an input surface located proximate to said second focal point to collect said electromagnetic radiation;

said input surface having a first input dimension and a second input dimension, said second input dimension being substantially orthogonal to said first input dimension; and

wherein said first input dimension is substantially unequal to said second input dimension.

18. The NA equalizing system of claim 17, wherein said reflector has a coating that reflects only a pre-specified portion of the electromagnetic radiation spectrum.

19. The NA equalizing system of claim 18, wherein said coating only reflects visible light radiation, a pre-specified band of radiation, or a specific color of radiation.

20. The NA equalizing system of claim 17, wherein a portion of the electromagnetic radiation emitted by said source of electromagnetic radiation impinges directly on said reflector and a portion of the electromagnetic radiation does not impinge directly on said reflector and wherein said system further comprises an additional

reflector constructed and arranged to reflect at least part of the portion of the electromagnetic radiation that does not impinge directly on said reflector toward said reflector through the first focal point of said reflector to increase the flux intensity of the converging rays.

21. The NA equalizing system of claim 20, wherein said additional reflector comprises a spherical retro-reflector disposed on a side of said source opposite said reflector to reflect electromagnetic radiation emitted from said source in a direction away from said reflector toward said reflector through the first focal point of said reflector.

22. The NA equalizing system of claim 17, wherein said reflector comprises at least a portion of a substantially ellipsoid surface of revolution.

23. The NA equalizing system of claim 17, wherein said reflector comprises at least a portion of a substantially toroidal surface of revolution.

24. The NA equalizing system of claim 17, wherein said reflector comprises at least a portion of a substantially spheroidal surface of revolution.

25. The NA equalizing system of claim 17, wherein said reflector comprises:

a first reflector having a first optical axis, said first focal point being a focal point of said first reflector, said first focal point being on said first optical axis;

a second reflector having a second optical axis, said second focal point being a focal point of said second reflector, said second focal point being on said second optical axis; and

wherein said second reflector is disposed substantially symmetrically to said first reflector such that said first optical axis is collinear with said second optical axis.

26. The NA equalizing system of claim 25, wherein said first and second reflectors comprise at least a portion of a substantially paraboloid surface of revolution.

27. The NA equalizing system of claim 25, wherein said first reflector comprises at least a portion of a substantially hyperboloid surface of revolution and said second reflector comprises at least a portion of a substantially ellipsoid surface of revolution.

28. The NA equalizing system of claim 25, wherein said first reflector comprises at least a portion of a substantially ellipsoid surface of revolution and said second reflector comprises at least a portion of a substantially hyperboloid surface of revolution.

29. The NA equalizing system of claim 25, wherein said first and second reflectors comprise at least a portion of a substantially ellipsoid surface of revolution.

30. The NA equalizing system of claim 17, wherein said source comprises a light-emitting arc lamp.

31. The NA equalizing system of claim 30, wherein said arc lamp comprises a lamp selected from the group comprising a xenon lamp, a metal halide lamp, an HID lamp, or a mercury lamp.

32. The NA equalizing system of claim 30, wherein said source comprises a filament lamp.

33. The NA equalizing system of claim 17, comprising further a waveguide disposed proximate to said transmission element to collect said electromagnetic radiation, wherein said waveguide is selected from the group consisting of:

a single core optic fiber,

a fiber bundle,

a fused fiber bundle,

a polygonal rod,

a hollow reflective light pipe, and

a homogenizer.

34. The NA equalizing system of claim 33, wherein a cross-section of said waveguide is selected from the group consisting of:

a circular waveguide,

a polygonal waveguide,

a tapered waveguide, and

a combination thereof.

35. The NA equalizing system of claim 33, wherein said waveguide comprises a material selected from the group consisting of quartz, glass, plastic, or acrylic.

36. The NA equalizing system of claim 17, comprising further a fiber optic, the fiber optic being illuminated by the radiation collected at said transmission element, the fiber optic releasing the collected radiation to provide for illumination at a desired location.

37. The NA equalizing system of claim 17, further comprising:

a condenser lens disposed proximate to said transmission element;

an image projection system disposed proximate to an output side of said condenser lens;

an image being illuminated by the radiation collected and condensed at said optical coupling element, the projection system releasing the collected and condensed radiation to display the image.

38. The NA equalizing system of claim 17, wherein said NA equalizing element comprises further:

an axis;

an output surface, said output surface comprising:

a first output dimension and a second output dimension, said second output dimension being substantially orthogonal to said first output dimension, said second output dimension being substantially parallel to said second input dimension; and

a first input NA in a plane of said first input dimension and said axis;

a second input NA in a plane of said second input dimension and said axis;

wherein a first ratio of a first product of said first input dimension and said first input NA to said first output dimension is substantially equal to a second ratio of a second product of said second input dimension and said second input NA to said second output dimension.